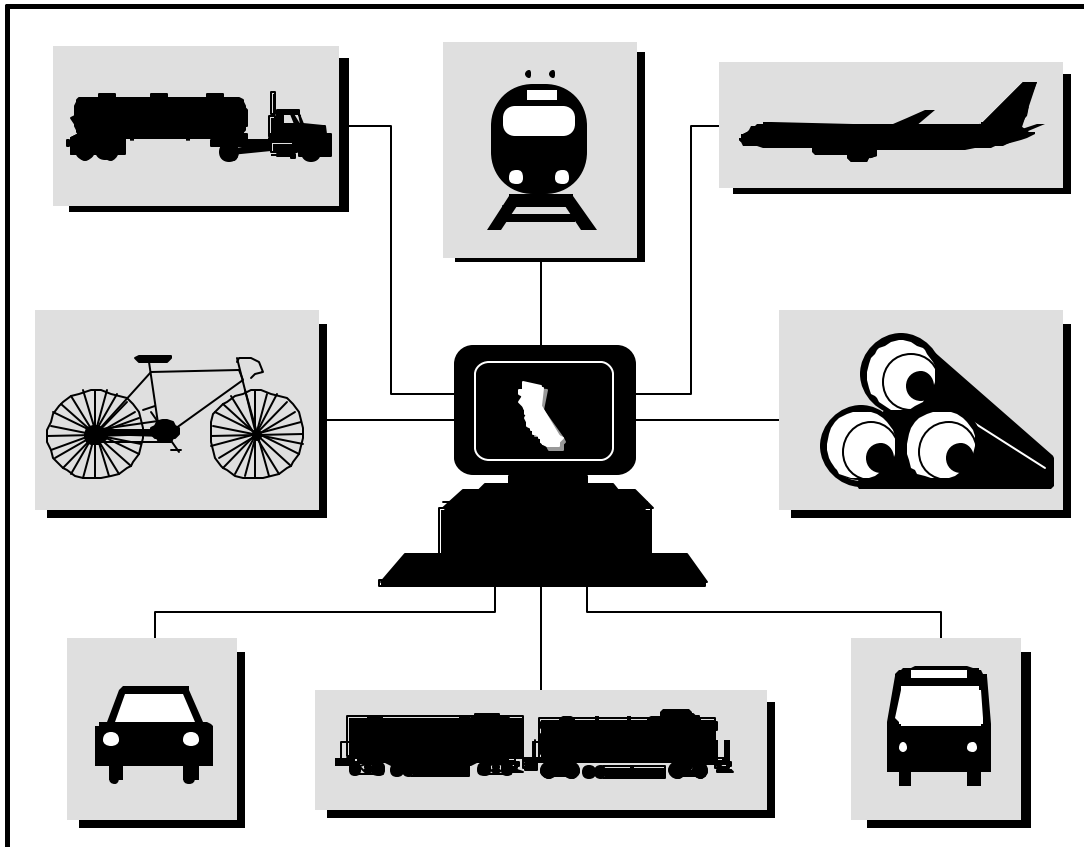California
Intermodal Transportation
Management System
(ITMS)

ITMS USER'S GUIDE

Prepared for

California Department Of
Transportation

Prepared by

Booz·Allen & Hamilton Inc. Team

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Highways (Autos and Trucks)

Passenger Bus

Passenger Rail

Other Intercity Rail

Air Routes

Note: Other network information is available for goods movement.
(ie. freight rail, pipelines, and shipping lanes).

APPENDIX B- DATA DICTIONARY FOR FACILITIES

Airports

Cruise Terminals

Intermodal Freight Facilities
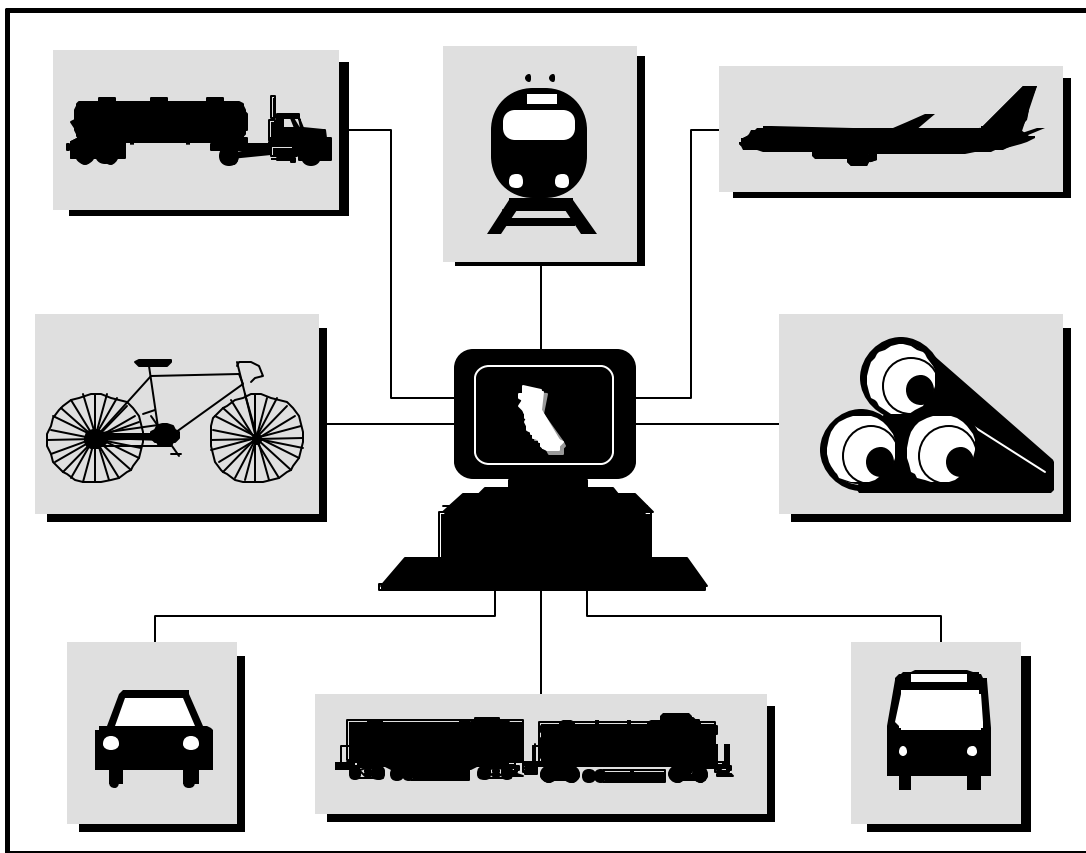
Intermodal Transit Stations

Ports

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Section I

INTRODUCTION

I.   INTRODUCTION

This User's Guide describes the Intermodal Transportation Management System (ITMS) Version 3.0, which is a computer application developed for Caltrans.

The ITMS is a decision support tool designed to assist planners in evaluating the performance of California's multi-modal transportation network and facilities. Planners should use the ITMS early in the planning process to identify deficiencies in the system and to develop potential actions and strategies to mitigate deficiencies. The ITMS can help evaluate their effectiveness through a series of performance measures. The ITMS is structured to allow the user to assess a broad range of alternatives and identify the best candidates to move forward with more detailed planning analysis.

The ITMS adds value to planners and managers in several ways:

- **Leverage existing investment in data.** The ITMS combines spatial (i.e., mapping) and attribute (i.e., tabular) data from more than 250 independent sources in one relational database. This provides access to information that may otherwise be difficult and expensive to gather, even if planners were aware of available sources of data.

- **Provide comparable multi-modal data.** The ITMS provides similar data across modal and facility types, including highway, transit bus and rail, inter-city bus and rail, commercial aviation, waterborne and pipelines systems.

- **Access person and freight demand data.** The ITMS includes current and forecast person and freight demand data by corridor, facility and mode. Person demand data was gathered from Metropolitan Planning Organizations (MPOs), Regional Transportation Planning Agencies (RTPAs) and from the Caltrans programs. Current and forecast freight demands were generated from the Reebie Associates TRANSEARCH Database, Port Import Export Reporting System (PIERS), the federal way bill sample, and other sources.

- **Use geographic information system (GIS) capabilities.** The ITMS operates on the Environmental Systems Research Institute (ESRI) ArcView 3.1 and 3.2 for the PC user and ArcView 3.0a for the Macintosh user. The user can take advantage of the range of functions that ArcView offers to incorporate additional spatial and tabular data into the ITMS. The ITMS spatial data is not projected. The data is in decimal degrees.

- **Analyze mode shifts.** The ITMS also includes a mode shift model for person travel. This model produces a general estimate of the expected market response to proposed transportation actions and strategies in the project-screening phase. While the mode shift model facilitates sketch planning, it is not a replacement for comprehensive travel demand models.

- **Identify deficiencies.** The ITMS includes tools to identify transportation system deficiencies based on pre-established or user defined standards. The GIS interface allows easy map location of identified deficiencies.

- **Develop actions and strategies.** The ITMS uses smart forms to help the user define potential actions and strategies to improve transportation system performance.

- **Measure performance impacts.** The ITMS includes a number of performance measures addressing mobility, financial cost, economic impact, emissions and safety. Incorporating performance measures into the ITMS allows for consistent and comprehensive analyses of proposed actions and strategies.

The California ITMS establishes a new multi-modal planning capability with detailed data and analysis. The features it offers support macro-level planning and decision making.

The ITMS is an on-going effort to design, develop, and implement an intermodal management and planning tool. The current ITMS is the third version developed so far. It was developed under the direction of Caltrans with considerable input from state, Metropolitan Planning Organization (MPO), Regional Transportation Planning Agency, port operator, transit operator, and private sector transportation carrier and shipper representatives.

The latest version of ITMS includes several improvements over previous versions:

- Updated data. Regional travel patterns have changed significantly since the first release of the ITMS. New travel demand model data from MPOs have been incorporated. Version 3 also includes updated data for the following facilities:

  – airports
  – tanker terminals/tank farms
  – transit facilities

- – intermodal facilities
- – ports.

- Input from Caltrans Districts. Each district provided the ITMS with the multimodal network most significant to planners in that district.

- Unconstructed facilities. The new version of the ITMS contains proposed routes, routes under construction in 1996, and future transit facilities.

- New airports. Based on feedback from users, these new airports include:

  - – Fresno
  - – Monterey
  - – Santa Barbara
  - – Palm Springs
  - – Long Beach

- Freight-Flow Processor. The original ITMS allowed users to conduct "what-if" analyses for person movement. Freight flows were assumed to remain fixed. The new ITMS continues to allow users to conduct person-movement what-if analyses but adds a powerful freight-flow processor. The processor is based on the extensive Caltrans/Reebie Associates TRANSEARCH database, using real cost data and a logic-based mode choice network.

  - The new California TRANSEARCH database contains much more geographically detailed data about freight movement throughout the state.

  - This data has been assigned to the highway and rail networks as in previous versions of the ITMS. However, the freight information has been simplified in the new ITMS with fewer fields and information that is more descriptive.

  - An added feature of ITMS version 3 is that freight flows have also been assigned to air corridors.

- Improved Graphical User Interface (GUI). The most impressive new feature of the ITMS is the enhanced GUI. The new interface greatly improves the time it takes to perform an analysis.

The rest of this user guide provides all the details that a user needs to run the ITMS.   Additional information is provided in a companion volume, "ITMS Basic Documentation." The guide is organized in the following sections:

- **II. Getting Started** provides a summary of the model's requirements, installation and start-up.

- **III. Analysis Framework** provides an overview of the modeling and performance measurement functions of ITMS. Note that detailed documentation of algorithms and scripts is available in the ITMS Basic Documentation.

- **IV. Graphical User Interface** walks through the graphical user interface (GUI), including each menu option.

- **Appendix A: Data Dictionary for Networks** describes the fields of the ITMS Version 3 networks database.

- **Appendix B: Data Dictionary for Facilities** describes the ITMS Version 3 facilities database.

- **Appendix C: Glossary** defines commonly used terms in the ITMS

- **Appendix D: ArcView ITMS Data Loading.**

II. GETTING STARTED

The California Intermodal Transportation Management System (ITMS) supports transportation planning and management efforts by providing a broad array of data and analytic capabilities for sketch planning analyses. The ITMS operates on a fully functional Geographic Information System (GIS) -- ArcView version 3.x developed by Environmental Systems Research Institute, Inc. (ESRI). A single graphical user interface (GUI) in ArcView runs all ITMS applications. Although a basic understanding of GIS will be helpful to the user, this is not a requirement to use the application. Given the wealth of data included in the system, a user that has a working knowledge of GIS will be able to fully utilize the data by using both the ITMS Graphical User Interface (GUI) and the ArcView 3.x functions.

A. HARDWARE AND SOFTWARE REQUIREMENTS

Microsoft Windows

ArcView GIS 3.1 and 3.2
Computer: Industry-standard personal computer with at least a Pentium or higher Intel-based microprocessor, a hard disk, and a CD-ROM drive
Memory: 24 MB RAM (32 MB recommended)
Operating System: Windows 95/98/2000 or Windows NT 4.0

Or

ArcView GIS 3.0a
Computer: Industry-standard personal computer with at least an 80486 or higher Intel-based microprocessor, and a CD-ROM drive
Memory: 18 MB RAM (24 MB recommended)
Operating System: Windows 3.1, Windows for Workgroups, Windows 95 or higher, or Windows NT 3.51 or higher

Note: Not all extensions run on all versions of Windows

Macintosh

ArcView GIS 3.0a
Computer: A PowerPC computer running Mac OS System 7.1 or later with a hard disk, and a 1.44 MB capacity 3.5" floppy disk drive or CD-ROM drive
Disk space: 40 MB
Memory: 12 MB RAM with virtual memory enabled (18 MB RAM without)
Note: ArcView 3.0a is the last version that will run on a Macintosh. Versions 3.1 and 3.2 are not supported.

B.   USER REQUIREMENTS

The user needs to have a basic understanding of computer operations including:

- The ability to use Microsoft Windows for the PC or the Macintosh operating system to locate and start applications

- A basic understanding of ArcView 3.x to access data, export data, and operate the ITMS tool.

While not required, a working knowledge of ArcView 3.x will facilitate ITMS application and use.

C.   INSTALLATION

Installation of previous ITMS versions was complex and time intensive. It required the user to set up the application file structure on the computer prior to installing the data. ITMS version 3 has a greatly simplified installation procedure that relies on a self-extracting compressed file. This document explains the method of installing the Caltrans ITMS ArcView system on a personal computer. It is assumed that ArcView has been correctly installed upon the system. Macintosh users please refer to CD-ROM information jacket for installation instructions.

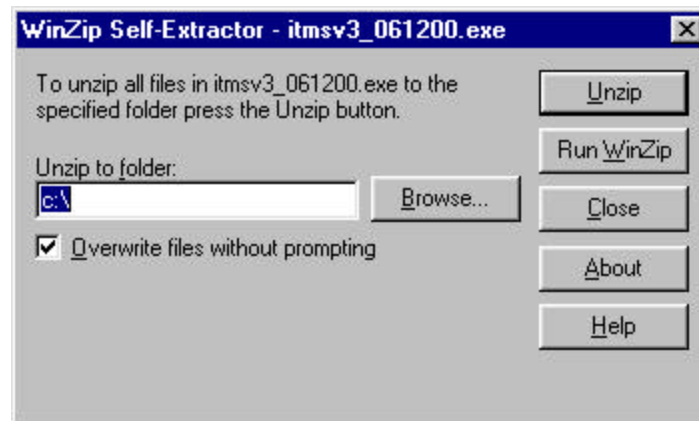ITMS Version 3 should be copied to the host hard drive to improve performance.

CD-ROM Installation

The Caltrans ITMS CD-ROM contains two files:

- A Microsoft Word document: "HOW TO GET THE CURRENT VERSION OF THE ITMS UP AND RUNNING ON.doc."

- A Self Extracting Zip file *itmsv3.exe*. This contains a compressed version of the ITMSv3 application.

To install the Caltrans ITMS v3 on the local hard disk together with the required data from the CD-ROM:

- Put the CD-ROM into the CD-ROM drive on your computer. Go to Windows Explorer to find the CD Drive

- From Windows Explorer, find the file *itmsv3.exe. D*ouble-click on this file to open the self-extracting window.

```
WinZip Self-Extractor - itmsv3_061200.exe                        ☒

To unzip all files in itmsv3_061200.exe to the          [ Unzip ]
specified folder press the Unzip button.
                                                        [ Run WinZip ]
Unzip to folder:
[c:\                    ]  [ Browse... ]                [ Close ]

☑ Overwrite files without prompting                     [ About ]

                                                        [ Help ]
```

- Make sure that you fill in the "Unzip to folder:" box to unzip the files to the "C:\" as shown in the window above.

- The **itmsv3** sub-directories and files will be copied automatically into a directory called "C:\itmsv3".

PC Users: After all the files have been unzipped, open Windows Explorer and locate the following file (C:\ITMSv3\getinput.exe). Right-click on the file and choose the Properties option. This should display the Properties Dialog box. Click the Program Tab, and make sure the "Close on exit" option is checked. If this option is not checked, the user will have to close the DOS window manually.

D.   START-UP

The ITMS is invoked by opening the directory (/itmsv3) containing the ITMS files and double clicking on the file named "itmsv3_pc.apr" for PC and "itmsv3-mac.apr" for a Macintosh. This action loads ArcView and automatically opens the ITMS GUI. *Section IV: User Interface* describes the ITMS GUI in more detail.

III. ANALYSIS FRAMEWORK

The California Intermodal Transportation Management System (ITMS) is a macro planning tool, providing access to multi-modal transportation data and analysis tools. The ITMS provides users with fast answers regarding impacts for a broad range of improvement alternatives.

The ITMS is an evolving effort to design, develop, and implement an intermodal management system. Caltrans directed the development of this third version of the ITMS with input from a broad range of state, regional, port, and transit agencies, as well as those representing private sector goods movement in the state.

ITMS Version 3 has an expanded database. The original ITMS focused on the corridors and intermodal transfer facilities of greatest economic importance to the State of California. The current ITMS has incorporated input from District staff, and it includes the multimodal network most significant to planners in that District. The highway network, for example, includes the transportation concept report (TCR) segmentation provided by the districts.

The ITMS is a decision support tool -- not a decisionmaker. The ITMS will facilitate planning efforts to define performance standards, locate deficiencies, develop improvement actions and strategies, and evaluate the impact of those strategies at a macro level. The ITMS adds value to planners and decisionmakers by providing better information early in the planning process including:

- Providing "at your fingertips" data from diverse, and often difficult to obtain, data sources

- Leveraging the investment in data (including freight data) by many transportation interests

- Identifying deficiencies based on default or user specified performance standards

- Facilitating the improvement action and strategy development process

- Providing access to a quick response person mode shift models

- Measuring performance consistently in terms of economic, environmental, financial, mobility and safety impacts

- Incorporating geographic information system (GIS) capabilities in locating transportation facilities and accessing data

- Encouraging communications and partnership on data, projects, and performance in a consistent manner early in the planning process.

Users are encouraged to give Caltrans clear feedback on tool performance, value, and potential enhancements. This feedback will guide the level of effort assigned to database and system update and maintenance, as well as to the future evolution of the system.

A.   ANALYTIC PROCESS

The analysis process or flow of the ITMS graphical user interface (GUI) was greatly improved in the ITMS v3. The new GUI guides the user through the process, greatly improving the time it takes to perform an analysis. This section provides a general overview of the process that users will follow in using the ITMS. The following chapter provides more detailed information on how to navigate through the ITMS GUI.

The process is straightforward and entails several sequential steps, as shown in Exhibit 2:

- Identify planning area(s) for analysis
- Locate deficiencies
- Develop actions and strategies
- Evaluate performance impacts
- Print reports

1.   Identify Planning Areas

The user begins an ITMS analysis by selecting the planning area and map view desired for the current session. Planning areas might be the state, Caltrans Districts, MPOs, RTPAs, counties, air basins, transportation management areas, business economic areas, or urban areas.

Exhibit 2
ITMS Methodology and Flow

```
┌─────────────┐
│ File /      │
│ Horizon     │
│ Selection   │
└─────────────┘
 • Saved Maps
 • 1996 Data
 • 2006 Data
 • 2016 Data
 • 2026 Data
```

```
┌─────────────┐
│ Select Map  │
│ Area &      │
│ Layers      │
└─────────────┘
 • Zoom
 • Planning Areas
 • Modes
 • Facilities
```

```
┌─────────────┐
│ Identify    │
│ Deficiencies│
└─────────────┘
 • Congestion
 • Posted Speed
 • Weight Limits
 • Geometrics
```

```
┌─────────────┐
│ Develop     │
│ Actions /   │
│ Strategies  │
└─────────────┘
 • Infrastructure
 • Service
 • Technology
 • Policy
```

```
┌─────────────┐
│ Evaluate    │
│ Performance │
│ Impacts     │
└─────────────┘
 • Mode Shifts
 • Financial
 • Economic
 • Mobility
 • Safety
```

```
┌─────────────┐
│ Prepare     │
│ Reports &   │
│ Maps        │
└─────────────┘
 • Disk
 • Printer
```

The view also requests which data sets to draw -- including a host of boundaries, modal corridors, and intermodal facilities. It is important to draw only those of greatest relevance to the current ITMS session, as the user has numerous transportation layers of information to choose from for analysis. Boundaries include:

- Air basins
- Business Economic Areas (BEAs)
- Caltrans districts
- Counties
- Metropolitan Planning Organizations (MPOs)
- Port areas
- Regional Transportation Planning Areas (RTPAs)
- State boundary
- Transportation Management Areas (TMAs)
- Urban areas.

Modal corridors include:

- Access roads to intermodal facilities
- Air routes
- Freight rail
- Highways
- Non-motorized modes
- Passenger bus
- Amtrak
- Transit rail
- Shipping lanes.

Intermodal facility types include:

- Airports
- Intermodal freight truck/rail facilities
- Passenger transit
- Ports
- Tanker terminals.

The ITMS has detailed data supporting these spatial entities, including geometric data, features, operational data, capacity, safety, utilization, and demand. Appendices A and B of this Users Guide contain detailed data dictionaries covering all ITMS data elements.

2.   Locate Deficiencies

The next step in a typical session would be to locate deficiencies. The ITMS GUI has several preprogrammed deficiency analyses, including congestion, posted speed, weight limits, and geometric constraints (e.g., height, width, depth). The GUI provides a default performance parameter for determining deficiencies. The user can accept the default or change it (e.g., volume to capacity ratio of 0.85). The GUI will then redraw the network with all areas worse than the standard drawn in bold red.

The information icon provided on the ITMS GUI, allows the user to examine the database for the deficient segments and learn more about the facility and nature of the project.

The user can also create new deficiencies that can be evaluated. This is done by editing "setup" tables in the ITMS.

3.   Develop Actions and Strategies

Knowing the nature of the deficiency and modal segment, the user would begin to develop alternative actions and strategies to resolve the deficiency.

3.1   Develop Actions

In ITMS, actions are discrete transportation improvement measures applied to a single mode. An action may involve:

- Infrastructure improvement, such as adding a free flow lane, high occupancy vehicle (HOV) lane**, bus lane, track**; or widening tunnels or strengthening bridges

- Service changes, such as increased or decreased bus or rail service

- Technology management, such as ramp metering, **changeable message signs, heavy vehicle weigh in motion, electronic toll collection**, advanced train control systems, **intelligent transportation systems, global positioning systems, or advanced traveler information systems**

- Policy, such as congestion pricing, changed weight limits, transit fare changes, speed limit changes, and increased fuel cost.

Using a congested highway as an example, separate actions might be developed which:

- Increase technology management through ramp metering and other efforts which increase the capacity of each existing lane

- Introduce congestion pricing, which serves to lower peak period highway demand and increase transit use

- Add an HOV lane, which **changes the vehicle occupancy** rate and shifts demand toward transit

- Add a free flow lane, which increases highway capacity

- Increase adjacent rail service or reduce price, which shifts some traffic to rail.

These are but a few examples of potential actions intended to address the problem. ITMS can address the actions independently (i.e., assume we implement a single action to solve the problem), or collectively as strategies.

3.2 Develop Strategies

The ITMS uses the term strategy to mean a grouping of actions, or a plan. If the above example actions are used, strategies might combined:

- Technology management, congestion pricing, and rail service expansion
- HOV lanes with enhanced bus service and congestion pricing
- Free-flow lanes with technology management.

The user is expected to make reasonable strategies. Combining actions like adding one free flow lane and adding two free flow lanes in the same strategy at the same location will not produce reasonable results as one action will be canceled out.

4. Evaluate Performance Impacts

The ITMS is structured to support evaluation of alternative actions and strategies in the planning process. Analysis capabilities include a person travel mode shift model, and a series of performance measures.

4.1 Person Travel Mode Shift Model

The person travel mode shift model is automatically invoked when the ITMS user selects evaluation of an action or strategy. The model is intended to be a quick response tool and does not replace travel demand models used by planning agencies. Most of the travel demand models use a four-step process for projecting demand by mode -- the ITMS uses the official projections provided by MPOs, RTPAs, and rural Caltrans Districts as a beginning point. The ITMS does not develop a demand forecast. It does modify an existing model's forecast contained in the database based on proposed actions and strategies.

The mode shift model can shift demand among highway, bus and rail modes within the same ITMS corridor. These modes can be further sub-divided into free-flow highway, HOV highway, transit bus, inter-city bus, commuter rail, transit rail and Amtrak, depending on the actual services available in a given corridor segment. The mode shift model does not address air or waterway travel. Further, the mode shift model redistributes demand among modes existing in the corridor based on changes in one or more modes. New modes or new routes cannot be introduced into ITMS

Factors which induce a mode shift in person travel in the ITMS include changes in:

- Access or terminal time
- Access or terminal price, including parking
- Travel time
- Travel price.

Changes in any of these factors should be entered into the database template as part of the action specification. Note that the mode shift model does calculate travel time changes based on the highway volume-to-capacity (v/c) ratio.

The mode shift model also uses a person market elasticity factor to adjust total market size based on price and cross elasticities among modes (price/trip ratio). The cross elasticities are calculated values based on observed market response. They are derived from the database by setting the four independent variables above equal across modes, and using the elasticity factor to develop a cross-modal price to level demand relationships. The specific algorithms are included as part of the detailed software documentation for the ITMS, which can be obtained from the Caltrans ITMS unit.

4.2   Performance Measures

Once the mode shift model has completed its analysis, the ITMS calculates the performance measures. The performance measures give the user access to evaluations from more sophisticated tools. For example, economic impact multipliers (jobs and gross state product) were developed using the Regional Economic Modeling Inc. (REMI) tool calibrated for California. The vehicle emissions and fuel consumption rates were produced by EMFAC7g -- the official air emissions analysis model calibrated by the California Air Resources Board. The volume to capacity ratios and speed calculations are based on the 1995 Highway Capacity Manual.

The ITMS performance measures include:

- Economic measures
  — Jobs supported by transportation operating and capital expenditures
  — Gross state product (GSP) impacts from transportation capital and operating expenditures

- Environmental measures
  — Fuel consumption
  — Green house gas emissions
  — Mobile source air pollution (carbon monoxide, hydro carbons, nitrogen oxides, particulate matter and total)

- Financial measures
  — Capital cost, operating cost and annual equivalent cost to service provider
  — Annual equivalent cost to transportation system users

- Mobility measures
  — Person throughput (mobility index)
  — Total person miles traveled (pmt) impacted
  — Total vehicle miles traveled (vmt) impacted
  — Lost time due to congestion

- Safety measures
  — Accidents
  — Deaths.

Measures are stated in terms of total change and change per person mile traveled (pmt), as appropriate.

Note that the user may wish to repeat the deficiency analysis here using the action or strategy as the analysis case to determine if a deficiency would be mitigated, and if the solution would be still effective in different demand projection years.

5.   Print and Plot

The final step in a given ITMS planning analysis session is to print and plot results on hard copy or to a file. When the user finishes an evaluation, the GUI asks if the user would like to print results to a file or printer. Results would include the action description(s), the strategy description, and all performance measure results.

The user can also plot a map displaying the action/strategy area, including beginning deficiencies and deficiencies remaining after the action. The ITMS GUI interactively guides the user through a plot activity.

B.   OTHER ITMS CAPABILITIES

As noted previously, the ITMS contains a wealth of multi-modal transportation planning area, corridor and facility spatial and attribute data, and is developed using a fully functional geographic information system (ArcView). The ITMS Users Guide is not intended to provide direction in the use of ArcView commands or menus -- reference the ArcView documentation and ArcView users guide for such information.

As an incentive to explore ArcView ad hoc query capabilities, several types of applications might be considered:

- The user can further modify the view provided by the ITMS GUI using ArcView commands (e.g., zoom in, zoom out).

- The user can change colors, line widths, labels, titles and other features using ArcView commands.

- Using ArcView commands to query the ITMS database, one can develop a profile of any feature in the database across a region or the state. As examples, the user may desire to:

    — Group volume-to-capacity ratios by level of service equivalent, producing a table of miles, vehicle miles traveled or demand volumes in each band width of congestion

    — Profile all rail height restrictions in terms of miles of track and tonnage or container equivalents per height range

— Profile freight tonnage's by corridor to determine the relative importance of ITMS facilities for goods movement

– Combine other compatible databases with the ITMS spatial and/or attribute data (e.g., census tiger files, Westex files).

These are a few examples of the types of additional capabilities and analyses, which may be performed by leveraging the additional capabilities of the ArcView command structure.

An experienced user can combine ITMS information with other databases (e.g., socioeconomic data, additional transportation elements, and journey-to-work data) to perform advanced planning analyses. In addition, an expert user may want to access the ITMS database using ArcView 3.x alone (i.e., without the ITMS GUI). The ITMS is flexible, and ArcView 3.x editing features for expansion and editing of the system (e.g., expanding or changing deficiency analyses, adding modal layers) are fully supported.

IV.   USER INTERFACE

The Intermodal Transportation Management System (ITMS) employs a graphical user interface (GUI) to guide and facilitate use of the planning tool. The GUI is developed in Avenue (a programming language imbedded in ArcView that uses smart forms developed with Neuron Data software). Using the ITMS is discussed in two sections: an overview of model structure/flow and a detailed description of menu options.

A.   OVERVIEW OF MODEL STRUCTURE

The California ITMS structure has a straightforward structure to support routine planning and management analyses. For a typical planning application, the user can simply follow the Main Menu layout, illustrated in Exhibit 3:

- •   Select data file and planning horizon or forecast year.

- •   Specify the map details desired. This includes the area that you have selected for study and the planning area boundaries, modes, and intermodal facilities.

- •   Identify deficiencies by type and mode selected. Deficiencies have default performance levels that can be changed by the user. Deficiencies include congestion, posted speed limits, and geometric constraints.

- •   Develop actions and strategies to mitigate deficiencies and improve transportation system performance. Actions might focus on infrastructure improvement, service changes, technology management, or policy. Individual actions can be combined into a coordinated strategy or plan.

- •   Evaluate performance impacts, which includes mode shift projections and a series of performance measures, for applications where net changes are expected from implementing actions or strategies. Categories of performance measures include mobility, financial, environmental, economic, and safety.

- •   The preparation of reports and maps is the final step, where results can be printed to a disk or printer for further use.

The ITMS is much more flexible than these steps suggest. At particular times while using an application, the user can toggle to the ArcView menu. Using standard ArcView controls, the user can manipulate and display different spatial and attribute

data. Also, the user is not required to follow the steps listed above and should feel free to use ArcView and ITMS tools in any combination or order to help analyze specific projects.

Exhibit 3
ITMS Menu Hierarchy

MAIN MENU

- **File**
  - **Save**
- **Edit**
- **Year**
- **Map**
  - **Area**
    - List
  - **Layers**
    - Boundaries
    - Modes
    - Facilities
  - **Save Map**
  - **Delete Map**
- **Deficiency**
  - **Analysis Case**
  - **Type of Deficiency**
    - Type
    - Mode
    - Standard
- **Action**
  - **Create**
    - Type
    - Screens
  - **Edit**
    - List
    - Screens
  - **Delete**
    - List
- **Strategy**
  - **Create**
    - List
  - **Edit**
    - List
  - **Delete**
    - List
- **Evaluation**
  - **Action**
    - List
  - **Strategy**
    - List
- **Plot**
  - **Create**
  - **Redisplay**
    - List
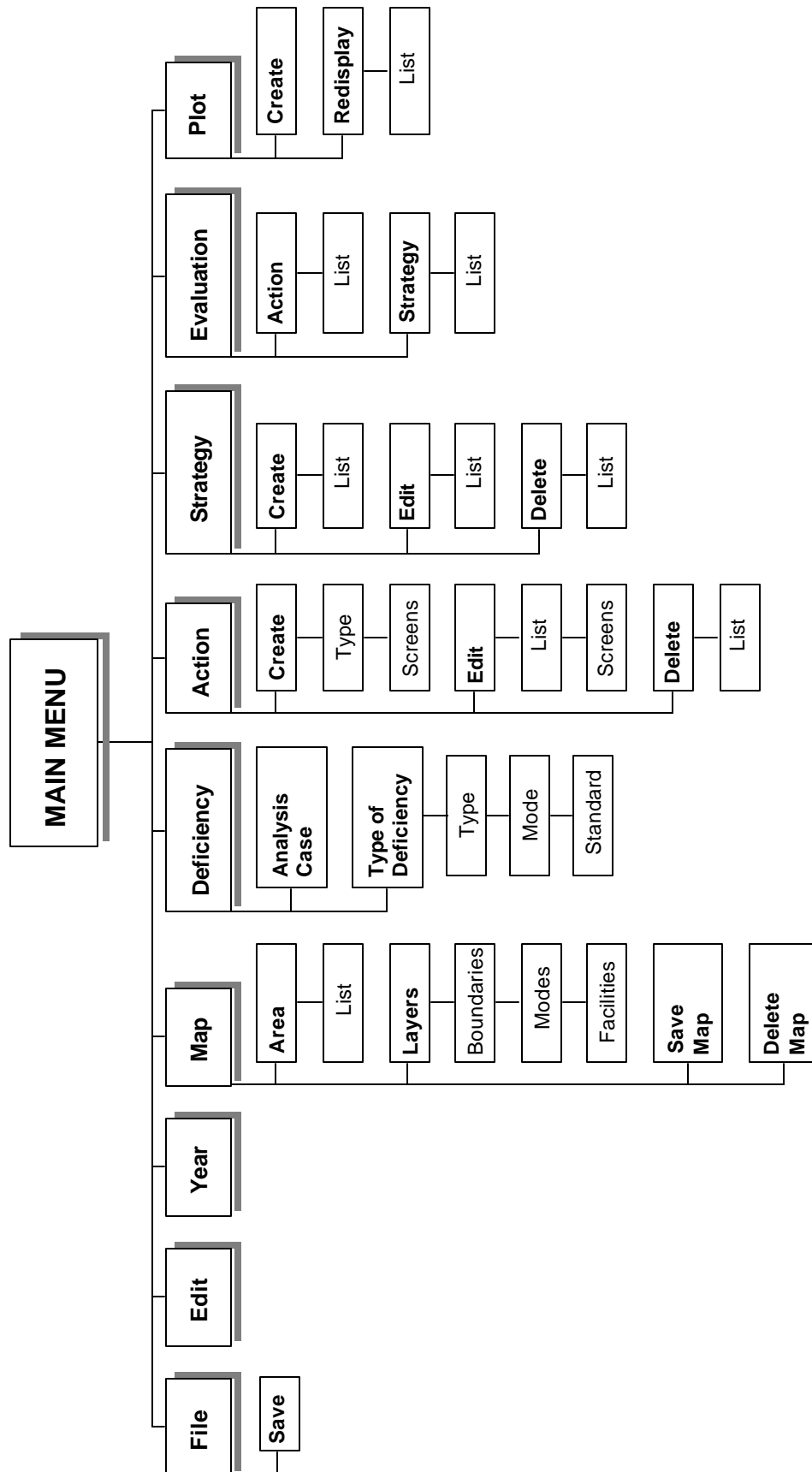
The ITMS menu hierarchy provides the user significant flexibility in how to approach an ITMS analysis. The Main Menu, and subsidiary menus, guide the user through the ITMS database and modeling applications. Once the ITMS is loaded, the user may select from any of the menu titles listed in the Main Menu to proceed. Each title activates a pull down menu of options. Subsequent menus appear in boxes mid-screen. When responses are completed within a menu hierarchy, control is returned to the Main Menu.

B.   DETAILED MODEL APPLICATION

This section reviews screen by screen user options when applying the ITMS graphical user interface. User selections may be made in several different ways:

- Pressing [ALT] and the underlined letter of any menu item will select that item.

- Placing the cursor over any pull down menu item and double clicking will select the item.

- Clicking on a pull down menu item and pressing [RETURN] or [OK] will select the item.

1.   Select Analysis Year

After the ITMS is invoked (i.e., double click on ITMS icon as indicated in Section II of this user's guide), a screen will appear requesting selection of the analysis year, as shown in Exhibit 4. The ITMS has a separate database for each analysis year (i.e., planning horizon) contained in the ITMS. The current version of the ITMS includes travel and freight forecasts for 1996, 2006, 2016, or 2026. The user makes a selection by moving the cursor (with a mouse or using the arrow keys) over the correct time period and either double clicking the mouse and pressing return or placing the cursor over the [OK] and double clicking the mouse. Selecting an analysis year prompts the ITMS to join the appropriate attribute data to the spatial information for an ITMS application.
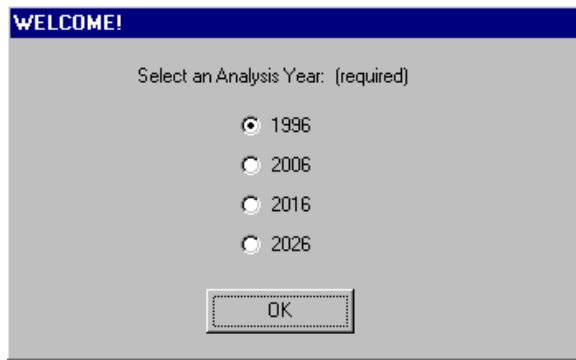
2.   Open Caltrans ITMS: Analysis Year

The initiation process takes several seconds as the ITMS begins to process and join files in preparation of an analysis.

3.   Main Menu

The Main Menu for the Caltrans ITMS, shown in Exhibit 5, provides primary control for user interface with the data and analytic procedures of the ITMS.
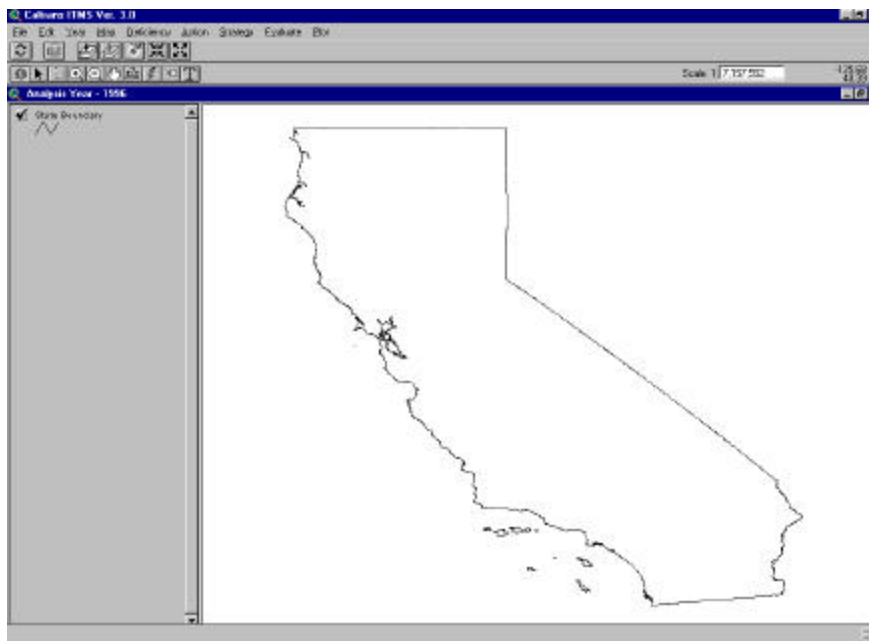
The menu provides the user with a variety of options:

- *Selecting File* allows the user to perform file maintenance work (see Section 4) or exit from the ITMS.

- *Selecting Edit* allows the user to identify and label features (see Section 5).

- *Selecting Year* allows the user to reset or change the analysis year, as shown in Section 6. This may be important in examining the nature of a deficiency over time, and in determining the effectiveness of an action or strategy over time.

- *Selecting Map* allows the user to specify the area and layers to be viewed with the ITMS, as shown in Section 7.

- *Selecting Deficiency* allows the user to specify the analysis case and type of deficiency to be reviewed, as discussed in Section 8.

- *Selecting Action* allows the user to create, edit or delete a proposed action, as noted in Section 9.

- *Selecting Strategy* allows the user to combine discrete actions into a plan or strategy, as shown in Section 10.

- *Selecting Evaluation* applies the mode shift model and performance measure algorithms, including printing, as discussed in Section 11.

- *Selecting Plot* allows the user to create or display a map on results, as discussed in Section 12.

- Toggling the 🔄 button moves the user between the ITMS GUI and the ArcView menu's, as presented in Section 13.

4. File Menu

Selecting File from the Main Menu pulls up the File Menu, which is shown in Exhibit 6.

Exhibit 6
File Menu

The user is offered several options:

• *New Project* allows the user to build a new project for GIS development, but this will mean that the user will have exited from the ITMS.

• *Open Project* takes the user to an ArcView menu and project listing to open other saved GIS projects.

• *Save Project* saves the current project under the same name. Note: Always rename your project when you start your analysis with itmsv3_pc.apr (itmsv3-mac.apr for Macintosh) (using *Save Project As* described below.).

• *Save Project As* brings up the screen shown in Exhibit 7, which allows the user to save the itmsv3_pc.apr (itmsv3-mac.apr for Macintosh) file under a different name preserving all edits made in the current application. The ITMS will not allow the user to overwrite the initial itmsv3_pc.apr (itmsv3-mac.apr for Macintosh) file. This file has been saved as a read-only file to prevent accidental overwriting.
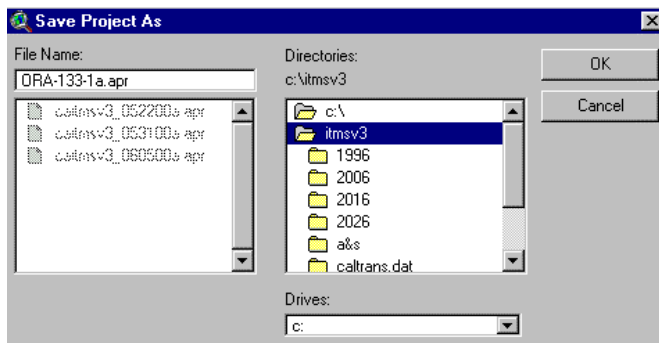
Exhibit 7
Save Project As

• *Edit Theme Properties* allows the user to edit the current ArcView theme using program commands.

• *Edit Legend* allows the user to edit the legend or title displayed on the screen.

- *Save Theme/Legend* allows the user to name and save the edits made to these items using ArcView commands.

- *Exit* closes the ITMS project and exits the user from the ArcView application.   Before the ITMS closes, the user will see the dialog box shown in Exhibit 8. Itmsv3_pc.apr (itmsv3-mac.apr for Macintosh) is write protected and cannot be saved. If the user indicates that saving the current model is desired (a "yes" response), a dialog box, like the one shown in Exhibit 7, will appear allowing the user to rename the file and save it.
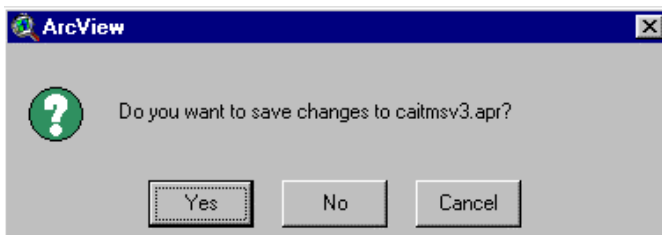
Exhibit 8
File – Exit

5.   Edit Menu

Selecting Edit from the Main Menu places control in the edit menu, illustrated in Exhibit 9. The edit menu allows four ArcView edit functions:
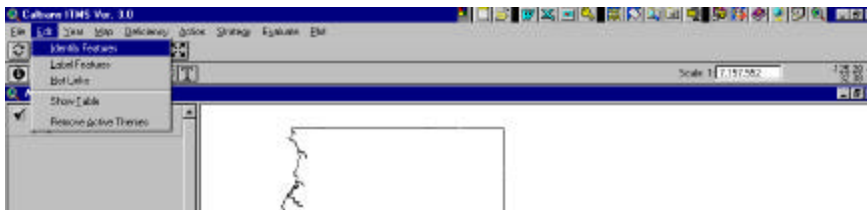
Exhibit 9
Edit Menu

- *Identify Features* graphically displays database attributes.

- *Label Features* allows the user to add a label to the selected feature (e.g., a highway segment). Users may input labels up to 254 characters long.

- *Show Table* allows the user to edit database attributes for the active theme.

- *Remove Active Theme* allows the active layer or area to be removed.

6.   Year Menu

Selecting Year from the Main Menu allows the user to change or specify the analysis year of data to be accessed for further ITMS GUI applications, as shown in Exhibit 10. The options include:

- *Reset Analysis Year* allows the user to return to the initial analysis year invoked when initiating the ITMS program.

- The base year and three forecast years are then listed for possible selection by the user. The latest version of the ITMS includes data for 1996, 2006, 2016, and 2026.

Once the selection is complete, the program will join the appropriate files for analysis. When this is complete, control is returned to the Main Menu.
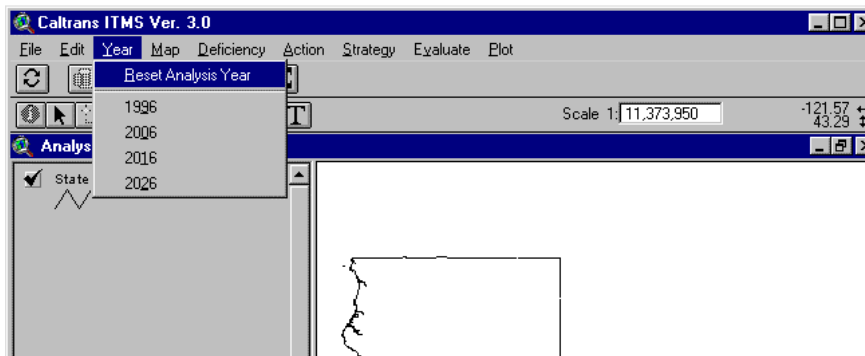
Exhibit 10
Year Menu

7.   Map Menu

Selecting Map from the Main Menu guides the user in definition of the spatial area and layers desired for the current application of the ITMS, as shown in Exhibit 11.
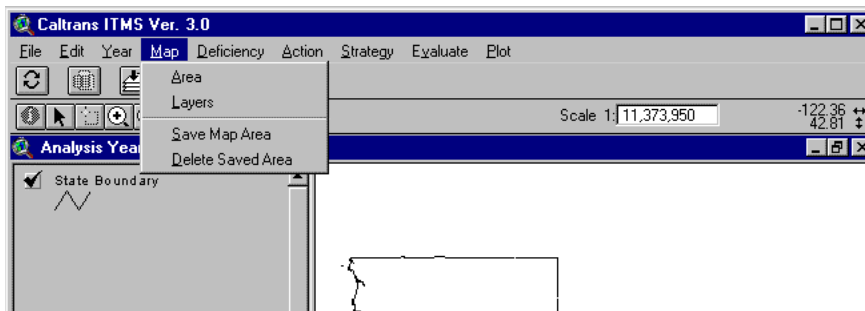
Exhibit 11

Map Menu

This menu offers several options:

- *Selecting Area* allows the user to specify the area type and then the name to be selected, as discussed in Section 7.1.

- *Selecting Layers* allows the user to select which boundaries, modes, and intermodal facilities to include on the map for the current application, as discussed in Section 7.2.

- *Selecting Save Map Area* allows the user to save the view that has been specified for future recall and use. This action is guided by ArcView commands, which allow the user to name the view and places the file in the appropriate directory for future recall. The saved views can be accessed following instructions under Section 7.1.

- *Selecting Delete Saved Area* allows the user to delete a previously saved map view that is no longer required. The GUI will present a list of previously saved views from the appropriate directory and allow the user to specify which are to be deleted.

When the application is complete, control is returned to the main menu.

7.1   Map Area

Selecting the map area to be viewed is a two step process. First, the user specifies the type of planning area of interest, and second the user selects the specific name(s) of the areas desired. The planning area options are offered in a menu, shown as Exhibit 12, include:
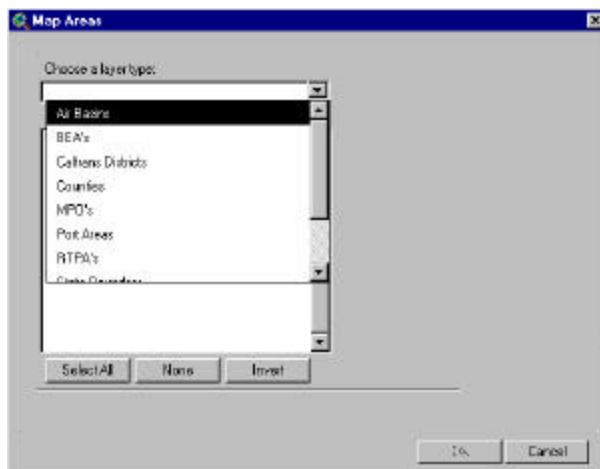
Exhibit 12
Map - Area

Once a Map Area Type is
selected a new list of items
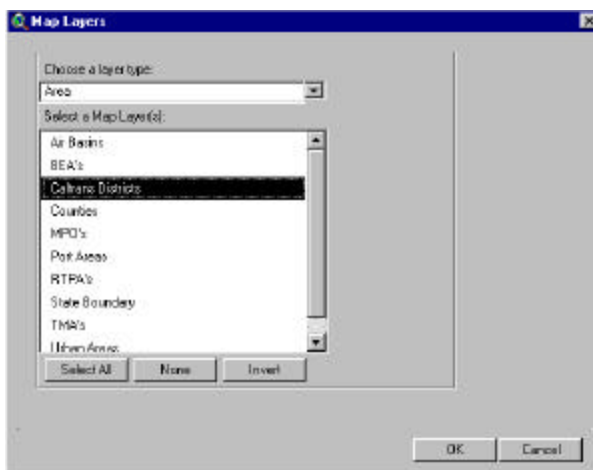appear below.

- Air basins
- Business Economic Areas (BEAs)

- Caltrans districts
- Counties
- Metropolitan Planning Organizations (MPOs)
- Port areas
- Regional Transportation Planning Areas (RTPAs)
- State boundary
- Transportation Management Areas (TMAs)
- Urban areas
- Saved areas
- Interactive designation.

Whenever one of the above planning area types is selected, a new list shows in alphabetical order the names of appropriate planning areas. For instance, if the user chooses RTPAs, the ITMS lists the Metropolitan Transportation Commission, Southern California Association of Governments, and other RTPAs. These are multi-select menus that allow the user to select all that apply to the current application. Single item selection is achieved by placing the cursor over the appropriate name and clicking the mouse once. Pressing the [SHIFT] key and single clicking over additional items allows the user to enter multiple selections. Several additional buttons are intended to facilitate speedy selection:

- *All* selects all named areas listed for map presentation.
- *None* removes highlights from names.
- *Reverse* selects all names not highlighted.
- *OK* accepts selections.
- *Cancel* returns control to the main menu.

When map boundaries are selected and accepted, the ITMS redraws the view zooming on the named boundaries highlighted. Note also that a legend of the boundaries drawn will appear to the left of the map. Any active boundary will have a check in the box beside the name. The user can delete boundaries by un-selecting items from the menus discussed above, or placing the cursor over the checked box and clicking. The view will be redrawn with the remaining boundaries drawn.

7.2   Layers Menu

Selecting the layers to be drawn on the map view requires several steps. Selecting Layers from the map menu places control in the menu shown in Exhibit 13.
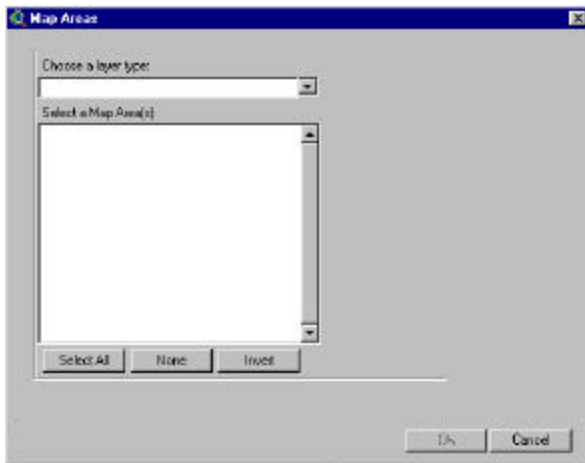
Exhibit 13
Map - Layers

Four options are provided:

- *Area* allows the user to select the area to be drawn, as shown in Exhibit 14. This is a multi-select menu that lists every planning area type described previously in Section 7.1. Multiple selection is achieved by pressing the [SHIFT] key and clicking once with the cursor over the desired boundary type. The planning area boundaries available include:

Exhibit 14
Map - Layers - Area

- — Air basins
- — Business Economic Areas (BEAs)
- — Caltrans districts
- — Counties
- — Metropolitan Planning Organizations (MPOs)
- — Port areas
- — Regional Transportation Planning Areas (RTPAs)
- — State boundary

   — Transportation Management Areas (TMAs)
   — Urban areas
   — Saved areas
   — Interactive designation.

• Selecting *Intermodal* from the map layers menu provides a multi-select list of facilities that can be drawn on the map view, as shown in Exhibit 15. The options include:

   — Airports
   — Freight rail intermodal facilities
   — Passenger transit
   — Ports
   — Tanker terminals.
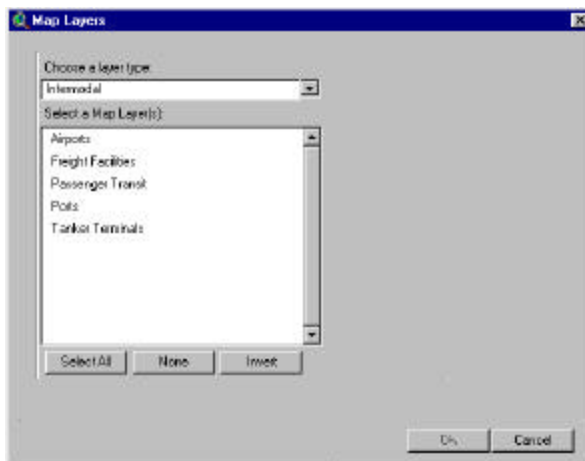
Exhibit 15
Map - Layers - Intermodal

• *Selecting Modes* from the map layers menu provides a multi-select list of modes that can be drawn on the selected map view, as shown in Exhibit 16. Among the options included are:

   — Air routes
   — Amtrak
   — Freight rail
   — Highways
   — Non-motorized
   — Passenger bus
   — Passenger rail
   — Pipelines
   — Shipping lanes.
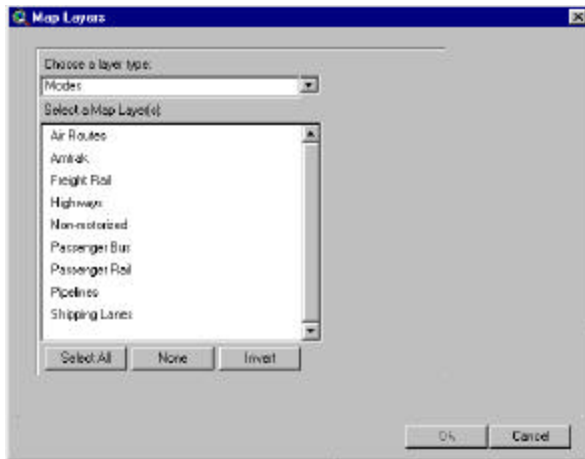
Exhibit 16
Map - Map Layers - Modes

When any of the multi-select menus is complete, control is returned to the main menu. Also, note that each selection requires ITMS to redraw the map, which may take several minutes.

8.   Deficiencies Menu

Selecting *Deficiencies* from the Main Menu places control in the deficiency menu, as shown in Exhibit 17.
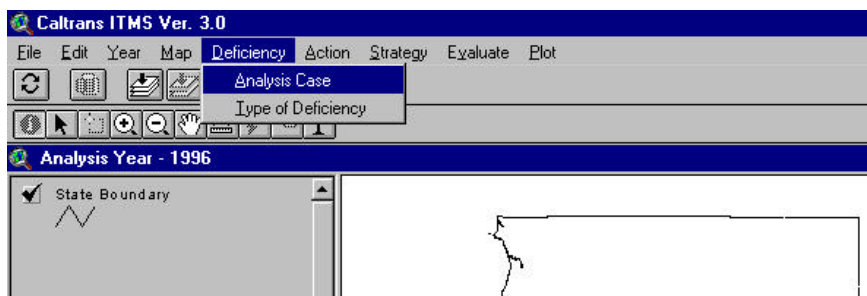
Exhibit 17
Deficiency Menu

This menu offers two options:

•   *Selecting Analysis Case* lets the user specify a proposed action or strategy to determine if the user can expect a deficiency to be mitigated by implementing an action or strategy, as shown in Exhibit 18. This section of the screen will list all previously saved actions or strategies that may be selected for deficiency analysis.

Exhibit 18
Analysis Case

- To run Analysis Case, the user must first select Action or Strategy from the Radio Button choices at the top of the Dialog. The pull down list below will contain the current list of Actions or Strategies, depending on the choice made earlier. Select the desired Action or Strategy from the pull down list. This will automatically display the descriptive information about that Action or Strategy. Once the Action or Strategy has been selected, the user should choose the type(s) of analyses needed to be performed:

  – Invoke Mode Shift Model
  – Invoke Freight Flow Processor

- At least one of these must be checked for the OK button to enable. Once all the selection and options are complete click the OK button to perform the Analysis Case.

- *Selecting Type of Deficiency* brings up another menu listing deficiency types available for analysis, as shown in Exhibit 19.
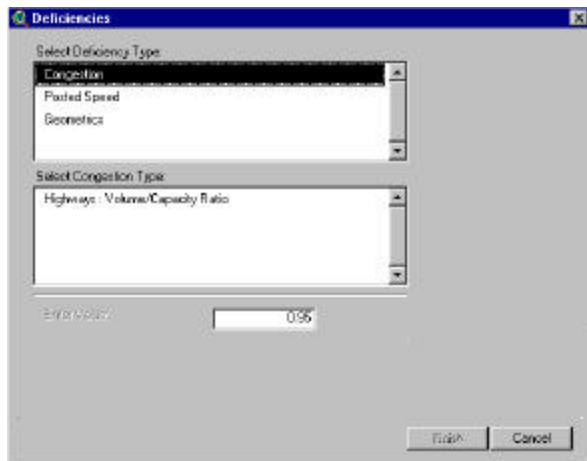
Once a deficiency type is selected, a menu showing applicable modes appears.

Three types of deficiencies are listed, including:

— Congestion
— Posted speed
— Geometric constraints (e.g., height, depth).

The next section of the menu in Exhibit 19 requests the mode for deficiency analysis when more than one mode may be applicable. The last option is to select the default deficiency parameter. The user can accept the default or overwrite it to specify a new standard.

When *Finish* is selected, the ITMS will perform the deficiency analysis and re-draw the map with all deficient areas (e.g., worse than the standard specified) highlighted in bold red.

The information tool, the zoom tool, and many other tools are available to the user to access the database information behind any link or segment of the transportation network. At this point, the user may choose to leave the ITMS GUI and use ArcView commands to query the database. The ArcView menu is accessed by clicking on the [⟳] button. ArcView commands can also be used to identify and highlight different levels of congestion. The ArcView manual provides guidance on these functions.

When ArcView operations are complete, the user can return to the ITMS GUI by clicking on the [⟳] button.

9.   Action Menu

Once the user has identified a deficiency, actions can be developed to mitigate that deficiency. Clicking on the action label in the Main Menu accesses the action menu, illustrated in Exhibit 20.
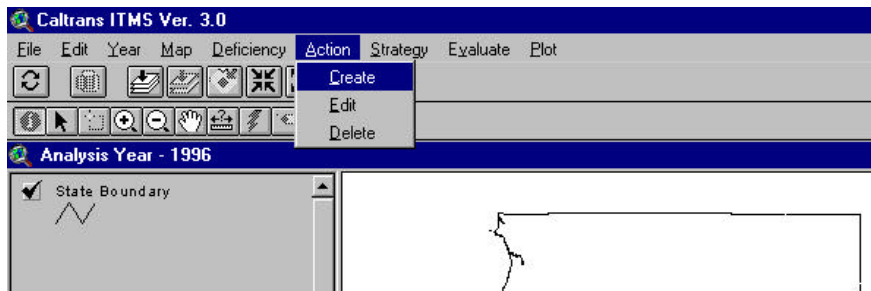
This provides three options:

•   *Create* allows the user to create a new action, as discussed below in Section 9.1.

•   *Edit* allows the user to edit an existing action as discussed in Section 9.2.

•   *Delete* allows the user to delete an existing action. If this option is selected, a list of all available actions will appear. The user can select the action(s) to be deleted and confirm the deletion.

When any of the Action activities selected is complete, control is returned to the Main Menu.

9.1   Create Action

The first step in creating an action is selecting the type of action to be created, as shown in Exhibit 21.
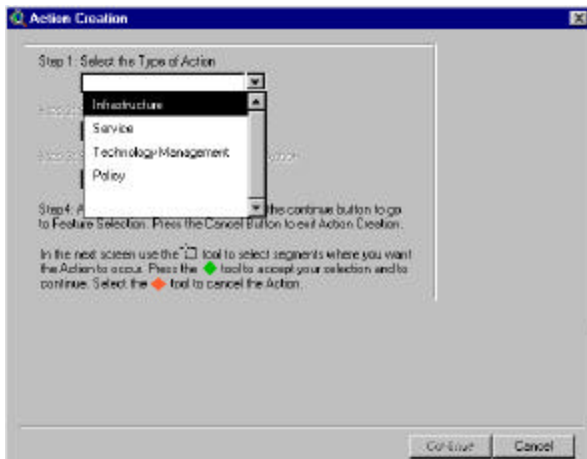
Exhibit 21
Action – Create – Action Type

Action types include:

- Infrastructure, which entails adding or expanding physical facilities on the ground. Adding free flow lanes, increasing tunnel geometrics, or strengthening bridges are the most common infrastructure improvements.

- Service, which entails increasing service levels without changing the infrastructure. Common service actions may include increasing or decreasing transit bus, inter-city bus, transit rail or inter-city rail headways, and service levels.

- Technology Management, which entails improving the performance of the existing transportation system through technology or demand management. This might include adding ramp metering or advanced train signal control systems. Frequently, these systems change the speed and capacity of existing transportation facilities.

- Policy, which entails global policy actions that affect transportation performance like congestion pricing, gas price increases, user fees, speed limits, and fare policy on transit.

Once this screen is complete, control is moved to the component type menu, shown in Exhibit 22. Here, the user must indicate the part of the transportation system the action will address.
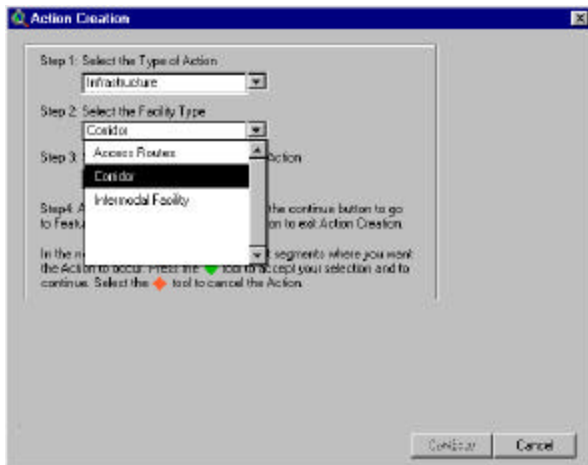
**Exhibit 22
Action – Create – Facility Type**

Options are:

- Corridor
- Intermodal facility.

Control is now transferred to the component mode menu, an example of which is shown for corridors in Exhibit 23. Similar lists appear containing intermodal facilities and access links, if one of those options is chosen. Actions can address only a single mode at a time, and a separate action needs to be developed for every mode impacted by an action.
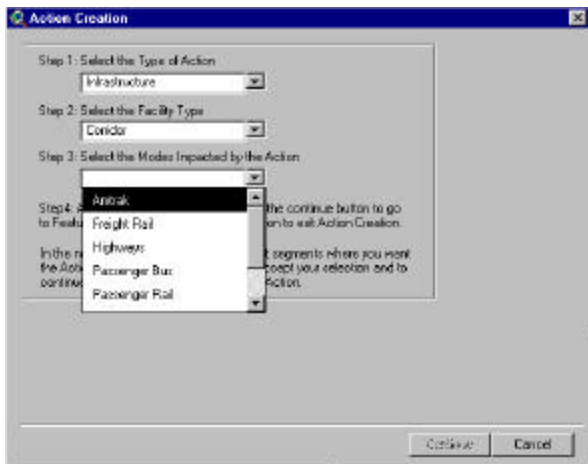
**Exhibit 23
Action – Create – Impacted
Modes**

Once the mode is chosen and the Continue button is selected, the screen appearance will be similar to the one shown in Exhibit 24 for highway corridors. The user selects the area of the modal network for which the action will apply. This is done one of three ways: 1. Placing the cursor on the map, mouse click once on the desired segment, holding down the shift key and single clicking on each additional desired

segment; 2. Placing the cursor on the map, clicking once, keeping the mouse button depressed, dragging out the window size to encompass the desired area, and then releasing the button; or 3. Switching to the desired modal database and through the query builder tool select the desired links.
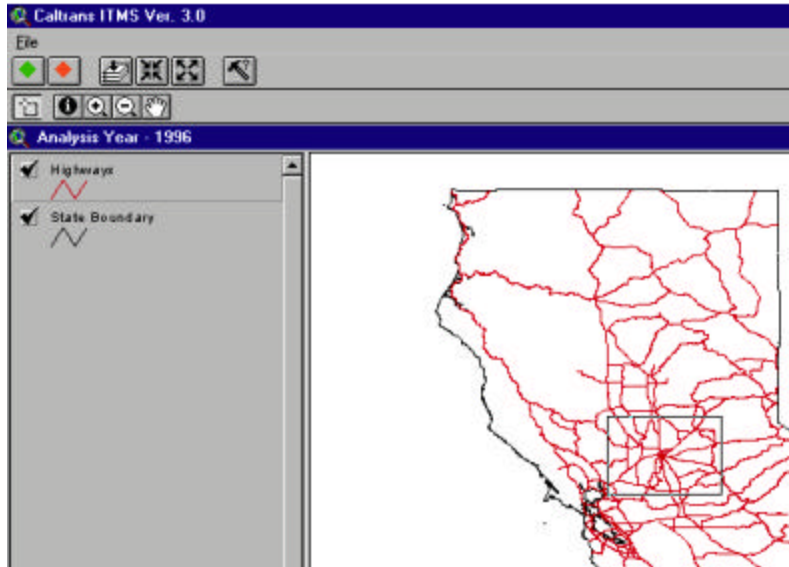
The chosen mode will be displayed on top. When complete, two new buttons, one green and one red, appear just below the top menu bar. If an error was made, selecting the red button will cancel the selection. After choosing the appropriate segment, move the cursor to the green button and click the mouse.

Control is now placed in an Action Information form, shown in Exhibit 25. The user needs to fill in every data element on the form to fully apply the ITMS analysis. Use the tab key or the mouse button to scroll down the form.

**Exhibit 25
Action Description
Screen**

The key fields include:

- *ITMS Action Name*, which requests a brief name (8 characters or less) for the action being defined.

- The *Action Concept/Rationale* box provides the user with space to describe what the action is intended to solve based on current or forecasted conditions.

- *Description of Action Limits/Scope*, which allows for several lines of text to explain the scope and nature of the proposed action. In this section, the names of agencies cooperating in the proposed action can also be identified.

- *Special Conditions*, which allows for several lines of text that describe key benefits or conditions not included in the ITMS performance measures (e.g., funding availability, right of way, wetlands, noise).

- If the proposed action is expected to create additional travel within the area, the *Market Impacts* field should be utilized. This is done by checking the Change in Market Size box, then entering in the percent change of the current demand in the modal network area that the action is expected to induce. An induced trip is a new trip expected to be made

as a sole result of implementing the action. This does not include shifts in travel from/to other modes -- these are calculated by the ITMS.

Clicking the button *Next* leads to the Action Costs screen, shown in Exhibit 26. This screen allows for cost information regarding the action to be entered:

- *Capital Costs* are one-time costs associated with the action. The user can enter costs for six subcategories: Environmental (related to environmental costs such as soil analysis), Design Engineering, Project Support (such as construction administration), R/W (obtaining right of way), Construction, and Mitigation (related to reducing noise, air pollution, and other impacts that the project may have on the surrounding community). Entering in values for each of these subcategories adds to the total capital expenditure expected for the entire project. If the user does not know the component cost estimates, then they can enter a total cost estimate in the bottom box. These cost estimates must be obtained from some other source as the ITMS does not provide them.

Exhibit 26
Action Costs

- *Annual Operating Costs* prompts for the recurring annual cost of the action in terms of four subcategories. These are: Operations / Maintenance, Rehabilitation (work related to major structural upgrades), Mitigation (related to reducing noise, air pollution, and other

impacts that the project may have on the surrounding community), Other. Entering in values for each of these subcategories adds to the total annual costs expected for the entire project. Again, if the user does not know the component cost estimates, then they can enter a total cost estimate in the bottom box. These cost estimates must be obtained from some other source and are not provided by the ITMS.

- *Length of Construction Period* asks for the expected number of months of actual construction time for the action.

- *Useful Life of Project* describes the expected years of useful life for the investment under normal maintenance conditions.

The user should choose *Select Next* when the action costs form is complete to the user's satisfaction. Now the user has an opportunity to edit any data field in the ITMS on the segments for which the action is planned. Field names for the detailed data files are defined in the Appendix of this user's guide. They include items such as the number of lanes or tracks, capacity measures, control systems, posted and actual speeds, geometric constraints, access time and cost, travel cost, and other fields that may change as a result of an action.

Data table editing can be performed one of two ways, as shown in Exhibit 27. The user can enter changes through a template for all selected database segments or enter data for individual features or segments.
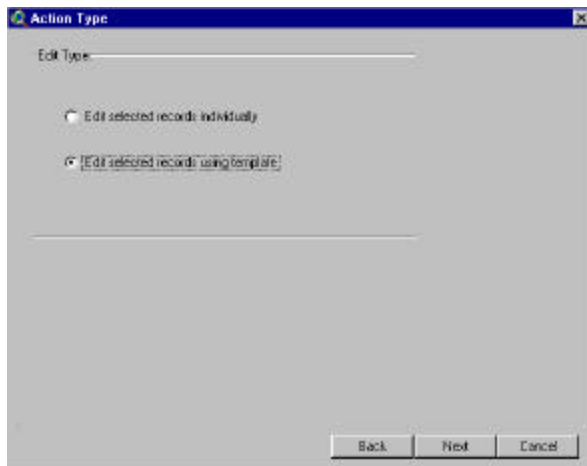
Exhibit 27
Action - Edit Type

The advantage of the individual features approach, shown in Exhibit 28, is that the user can view existing conditions in every data field and overwrite those with desired changes. A potential disadvantage is that this approach may require significant time if many segments are involved.
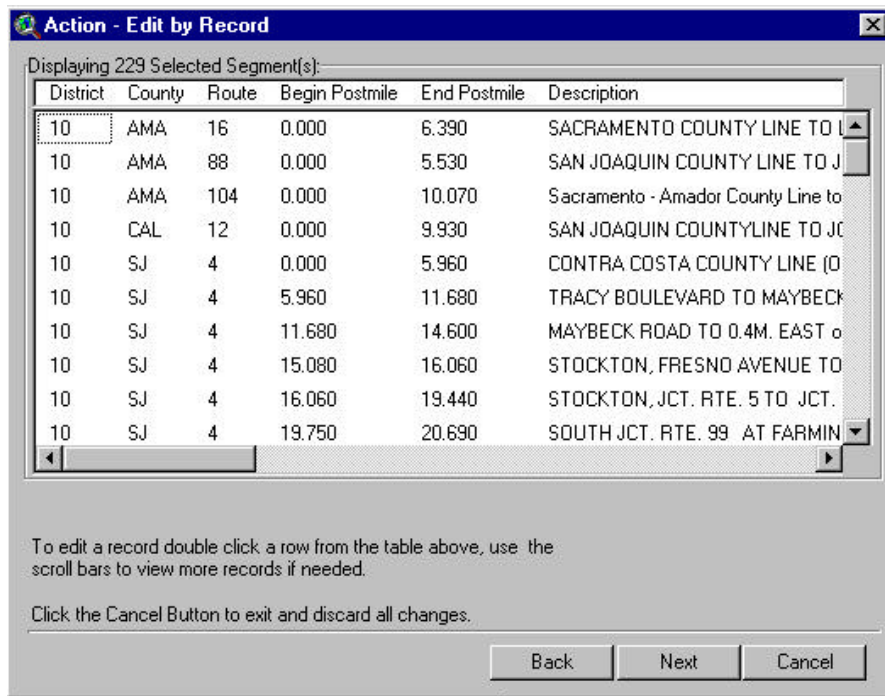
**Exhibit 28
Action – Edit by
Record**

The template approach, shown in Exhibit 29, provides a fast alternative when numerous segments are involved. Characteristics such as lane capacity, daily access time, peak access time, and posted speed can be changed quickly for a group of segments.

**Exhibit 29
Action – Edit by Template**

In either approach, move the cursor to the appropriate field(s) and type in the response desired. When all changes are complete, select *Next.* This will prompt the Action Finish screen, shown in Exhibit 30. The user has the choices to Save the Current Action and Exit, Save the Current Action and Create a New Action, and Save the Current Action and Run.

**Exhibit 30
Action – Action Finish**

With the *Exit* option, control is returned to the main menu. With the *Create a New Action* option, the user can repeat the action development for different modes and different actions in the corridor segment. With the *Run* option, the ITMS evaluates the

action (with the option to invoke or not invoke the Mode Shift Model), as described in Section 11.

9.2   Edit Action

Note that editing an existing action can also be done from the main action menu (shown in Exhibit 20). Selecting the edit option brings up the screen shown in Exhibit 31. The menu includes a pull down list of all actions saved in the ITMS database.
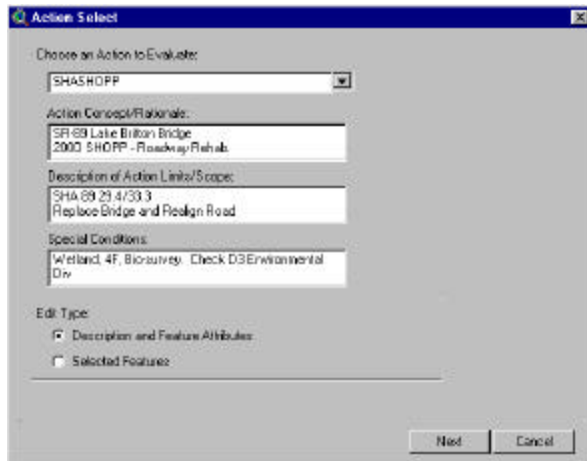
Exhibit 31
Action - Edit – Select Action

The lower part of this screen asks which action components are to be edited. The options are:

- *Description and Feature Attributes* allows the user to edit the action description form and costs shown previously as Exhibits 24-25, as well as the ITMS data fields via template or individual features (segments), shown in Exhibits 26-29.

- *Selected Features* allows the user to re-select the modal map segments to which the action applies.

10.   Strategy Menu

The strategy menu is shown in Exhibit 32. A strategy, for the purposes of the ITMS, is a collection of individual actions grouped into a plan. ITMS can evaluate actions individually, or examine the collective impact of a series of actions.
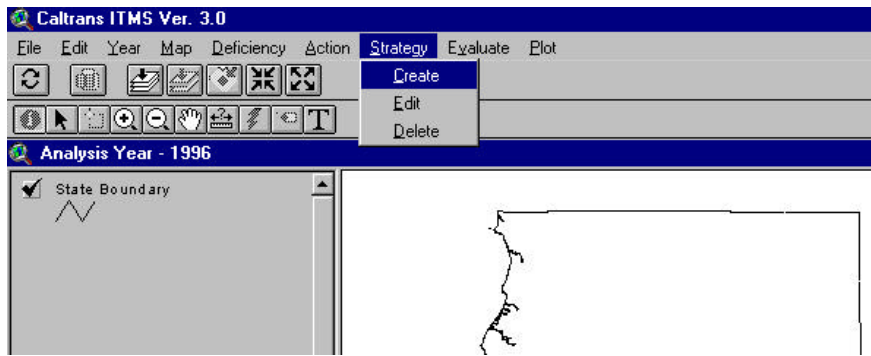
Exhibit 32
Strategy Menu

The strategy menu provides three options:

*   *Create* allows the definition of a new strategy as discussed in Section 10.1.

*   *Edit* allows editing of an existing strategy as discussed in Section 10.2.

*   *Delete* allows deletion of an existing strategy that is no longer needed. If this option is selected, a list of all existing strategies contained in the ITMS database is provided and the user can perform a multi-select function to identify those files to delete.

After the selection and subsequent screens are complete, control is returned to the Main Menu.

10.1   Create Strategy

Selecting *Strategy Create* passes control to the strategy description template, illustrated in Exhibit 33.
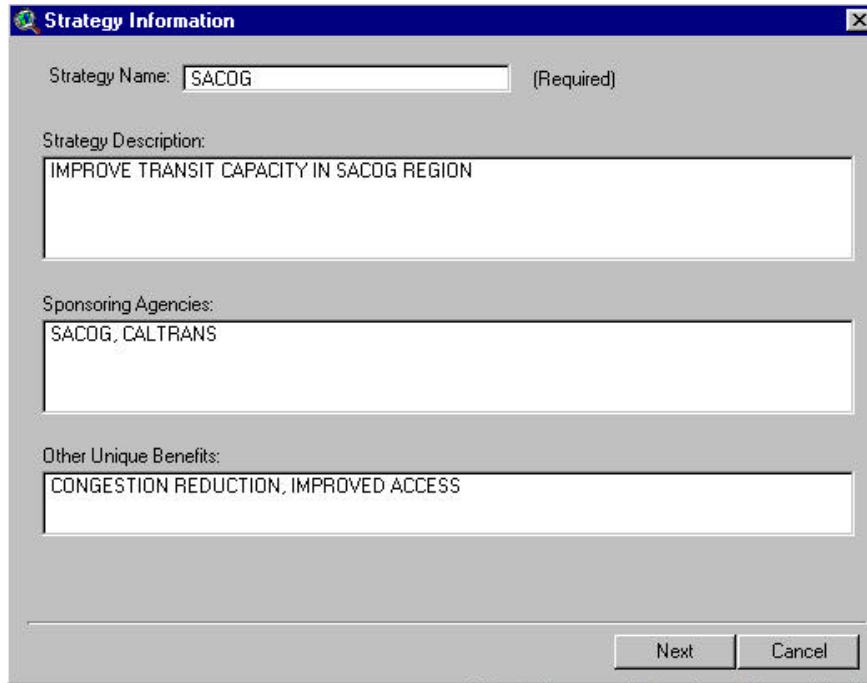
Several key fields are provided to describe the strategy:

*   *Strategy Name* requests for a brief name describing the strategy.

*   *Strategy Description* provides several lines of text to explain the scope and nature of the proposed strategy.

*   *Sponsoring Agencies* stores the names of agencies cooperating in the proposed strategy.

*   *Other Unique Benefit*s allows several lines of text to be entered that describe key benefits not included in ITMS performance measures (e.g., funding availability, right of way, wetlands, noise).

When complete, select *Next.* Control is transferred to a multi-select table, shown as Exhibit 34, which lists all action files saved in the ITMS database. The user is required to use the cursor and select each action file name to be included in the strategy. The selection of multiple actions as one integrated approach is the primary function of the strategy function. Once all appropriate actions are highlighted, select *Next.* Note

that the *Select All* option is provided if all actions are to be included as part of the strategy. Do not select multiple actions on the same mode for the same segments. They will be canceled out, leaving only one action to analyze.
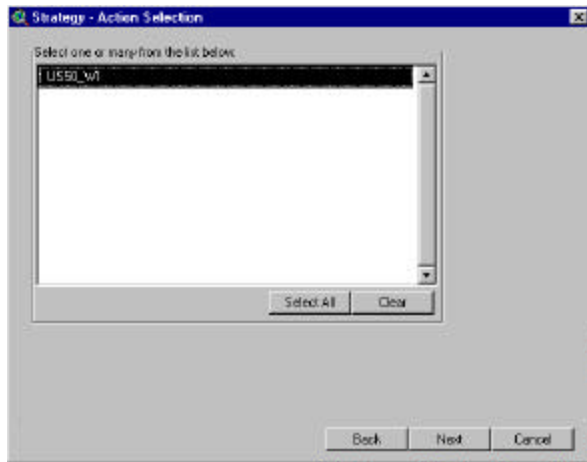

Exhibit 34
Multi – Select For Strategy

When the select for strategy option is complete and *Next* is selected, the screen shown in Exhibit 35 is displayed. The function of this screen is similar to the function that the screen in Exhibit 30 serves with respect to performing a single action.
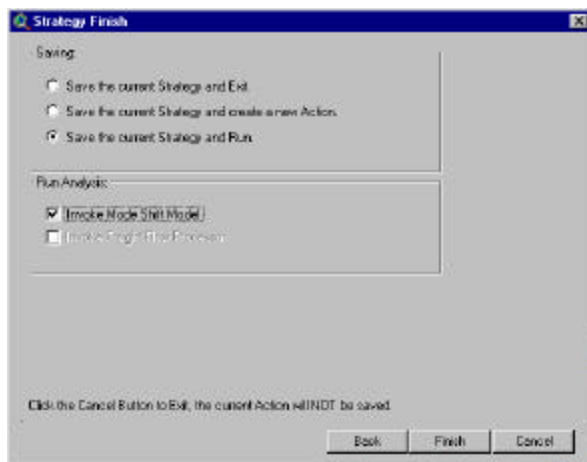
Exhibit 35
Strategy – Strategy Finish

10.2   Edit Strategy

If *Edit Strategy* is selected, the model passes control to the strategy select menu shown in Exhibit 36. All strategies saved in the ITMS database will be listed. The user needs to select the appropriate strategy and then click on *Next*. The strategy description, shown in Exhibit 33, can be edited, followed by the selection of actions contained in the strategy, shown in Exhibit 34. Once the edits are complete, control is returned to the Main Menu.
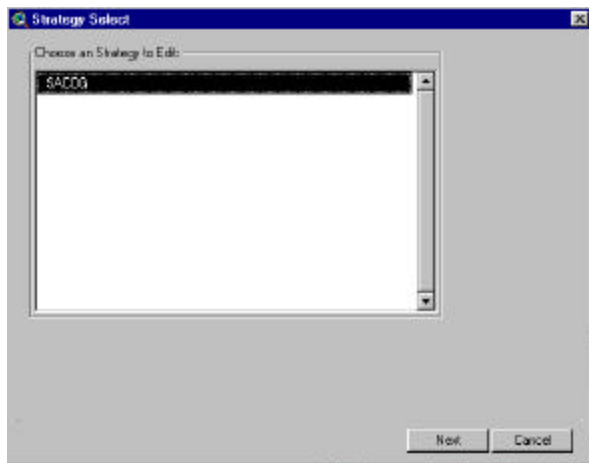
Exhibit 36
Strategy - Edit Strategy

11. Evaluate

Selecting *Evaluate* from the Main Menu allows the user to access the ITMS mode shift models and the performance measurement algorithms. Every time evaluation is selected, the user has the option to apply either or both the person mode shift model and freight flow processor. The user can also select some or all performance measures, which are grouped into several categories – mobility, financial, environmental, economic, and safety. The performance measures focus on net change as a result of an action or strategy.
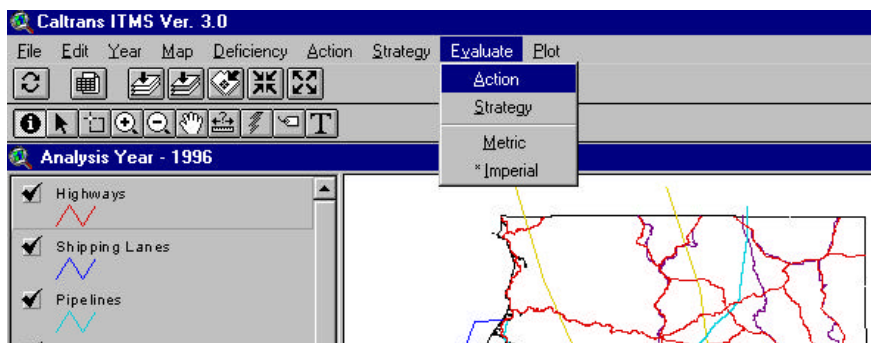
Exhibit 37
Evaluation Menu

This menu is followed by a list of actions or strategies, as per user selection.

The first menu, shown in Exhibit 37, requests the user to select:

• *Evaluate Action*, if the user wants to review the expected performance impacts of a single proposed action.

• *Evaluate Strategy*, if the user wants to review the expected performance impacts of a proposed strategy.

The menu also includes two other elements -- metric and imperial. These refer to the numeric reporting status of performance measures, which can be stated in either metric or imperial terms. The mathematical format with the asterisk (*) preceding the word is the one currently selected. The selection may be changed by a single click on the desired format.

If *Action* is selected, the next screen is a pull-down list of all actions stored in the ITMS database, as shown in Exhibit 38. Select the action for evaluation. If *Strategy* is selected, a screen with all saved strategies in the ITMS database appears as a pull-down list. Select the strategy for evaluation. Invoking the person mode shift model and the freight flow processor is an option that can be taken by selecting the check box.
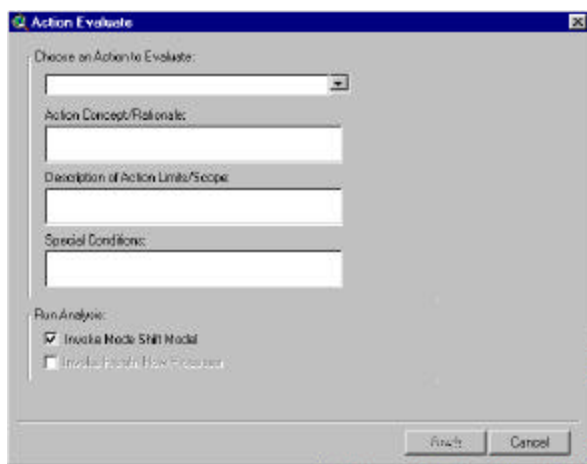

Exhibit 38
Evaluate – Action Evaluate

Selecting *Finish* applies each of the performance measure algorithms to the results. Depending on the complexity of the action or strategy, processing may require several minutes. When complete, a table of performance measure results appears on the screen, as shown in Exhibit 39.

When complete, select OK to see print options. The user can print the ITMS performance measure results, including the descriptions of the action(s) and strategy evaluated. Several menus will appear requesting interest in printing, what is to be printed, whether printing to a printer or file is desired, and finally defining the target for printing.

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Intermodal Transportation Management System (ITMS)
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EVALUATION RESULTS

ACTION NAME: **US 50_WI**
DESCRIPTION **Widen US 50 by one lane in each direction from Kyburz to Lake Tahoe**

PERFORMANCE MEASURES

I. **PERSON TRAVEL MARKET**

IA. **MOBILITY MEASURES**

	DAILY	**PEAK**
TOTAL PMT IMPACTED	6627901.50	39752.58
TOTAL VMT IMPACTED	4418601.00	30578.91

PERSON THROUGHPUT (or MOBILITY INDEX)

	DAILY	**PEAK**
BEFORE	82.50	53.58
AFTER	81.72	71.49
DIFFERENCE	-0.78	17.90
PERCENT DIFFERENCE	-0.94	33.41

LOST TIME DUE TO CONGESTION (in hours)

	DAILY	**PEAK**
BEFORE	120507.30	1041.87
AFTER	121654.39	722.91
DIFFERENCE	1147.09	-318.97
PERCENT DIFFERENCE	0.95	-30.61

IB. **FINANCIAL MEASURES**

COST TO SERVICE PROVIDERS (in dollars)

Capital Costs	300000000.00
Operating Costs	100000.00
Annual Equivalent Costs	100000.00
AEC Per 1000 Daily PMT	30.18

Exhibit 39
Intermodal Transportation Management System (ITMS)
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USER COSTS

	DAILY	PEAK
Net Change	3137206.71	19968.62
Change Per 1000 PMT	473.33	502.32

IC.   ENVIRONMENTAL MEASURES

NET CHANGES TO RUNNING EMISSIONS (in lbs)

	DAILY	PEAK
Carbon Monoxide	5.26	1.13
Hydro Carbons	8.32	2.56
Nitrogen Oxides	24.59	6.83
Particulate Matter	3.47	0.52
Total Change	41.64	11.04
Change Per 1000 PMT	0.01	0.28

NET CHANGES TO FUEL CONSUMPTION (in gallons)

	DAILY	PEAK
Total Change	914.14	208.30
Change Per 1000 PMT	0.14	5.24

NET CHANGES TO GREENHOUSE GAS EMISSIONS
(CARBON DIOXIDE in lbs)

	DAILY	PEAK
Total Change	74.71	29.26
Change Per 1000 PMT	0.01	0.74

ID.   ECONOMIC MEASURES

Jobs Supported Via
Capital Spent	3.79
Operating Spent	3.76

Gross Area Product Impacts Via
Capital Spent	230000.00
Operating Spent	220000.00

Exhibit 39
Intermodal Transportation Management System (ITMS)
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IE. **SAFETY MEASURES (in daily accidents based on statewide trend averages)**

BEFORE

Accidents	0.09
Deaths	0.00
Injuries	0.03

AFTER

Accidents	0.07
Deaths	0.00
Injuries	0.02

DIFFERENCE

Accidents	0.02
Deaths	0.00
Injuries	0.01

12.   Plot

The plot menu creates and/or displays the proposed action or strategy using GIS capabilities to produce a map with legends. The plot menu, illustrated in Exhibit 40, provides two options: create and redisplay.
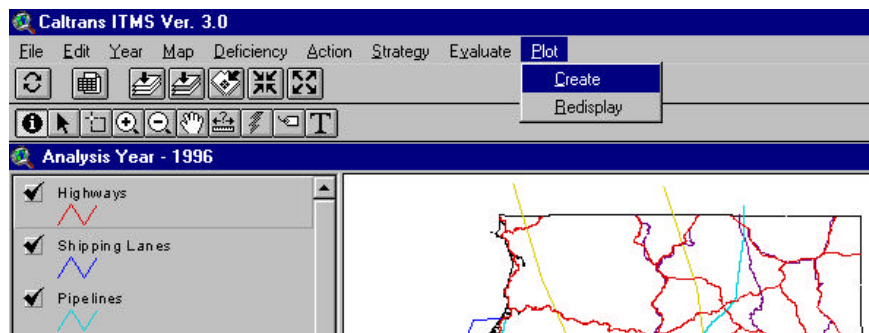
With the *Create* option, a plot of the planned action or strategy is created. This is followed by a screen (Exhibit 41) requesting verification of current map view themes, which the user can modify and then accept. The user is provide a file name for saving the map, and a map title -- both of which can be changed (Exhibit 42).

A template manager (or wizard) follows that allows selection of landscape or portrait formats, as shown in Exhibit 43. Once this is specified, the ITMS creates the plot on the screen. The title and all legends are included.
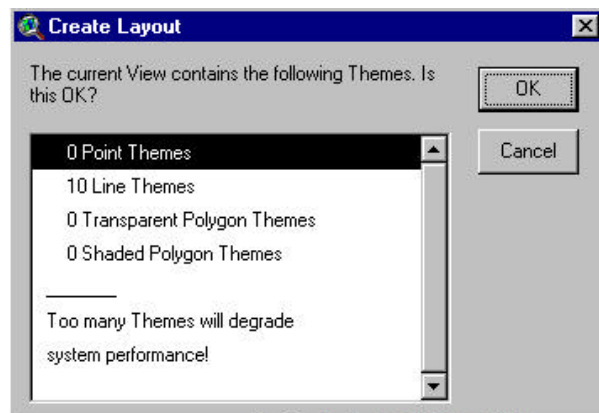
Exhibit 41
Plot – Create - File
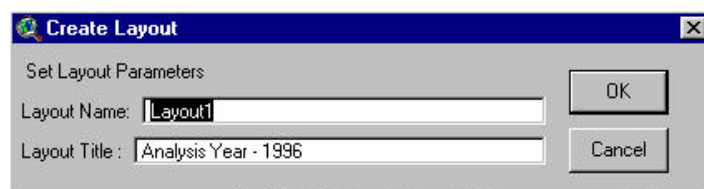
Exhibit 42
Plot – Create Layout
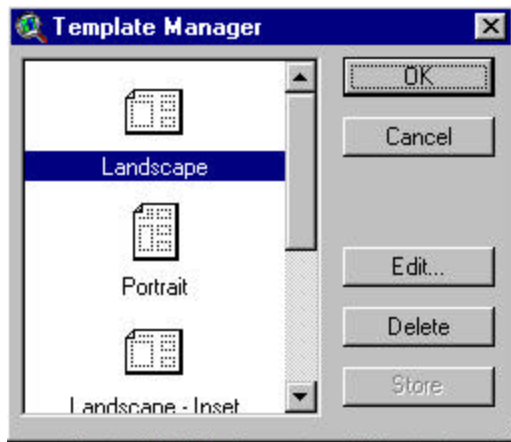
Exhibit 43
Plot - Create - Template Manager

After reviewing the map, the user needs to pull down the file menu (shown as Exhibit 44).
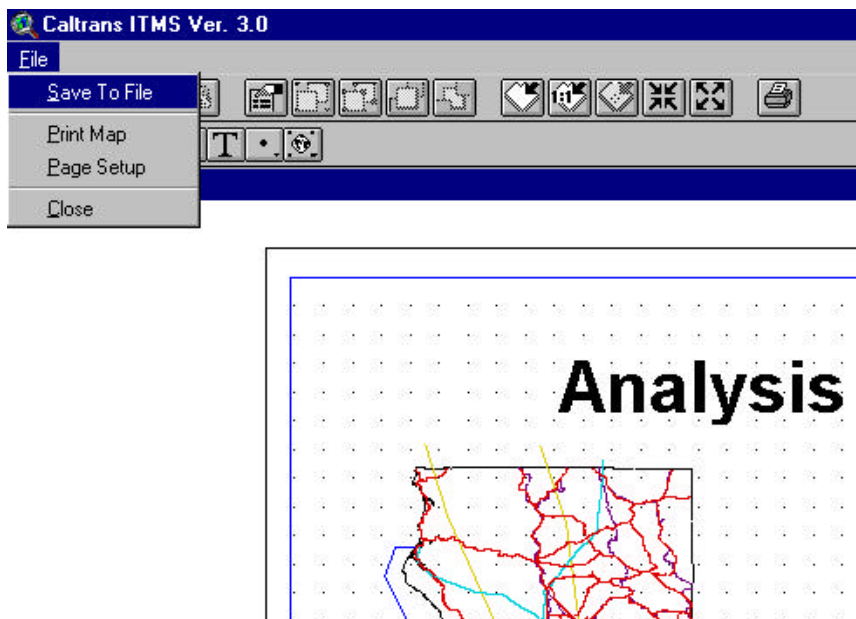

Exhibit 44
Plot – Create – File Menu

This provides several options:

- *Save to File* allows the user to save the map for later review and/or printing. The user specifies the file name and the ITMS stores it in the appropriate directory, as shown in Exhibit 45.
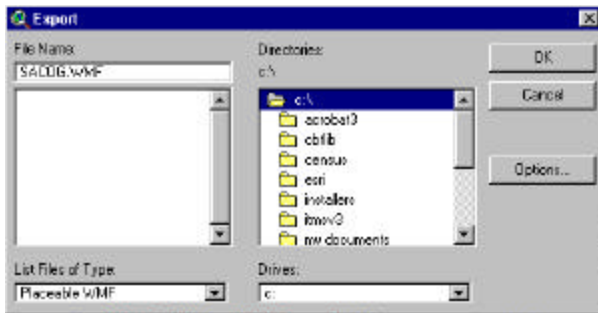
Exhibit 45
Plot - Create - Export

- *Print Map* allows the user to print the plot using the ArcView print command structure.

- *Page Setup* allows the user to specify the page set up in preparation for printing to a printer, shown in Exhibit 46.
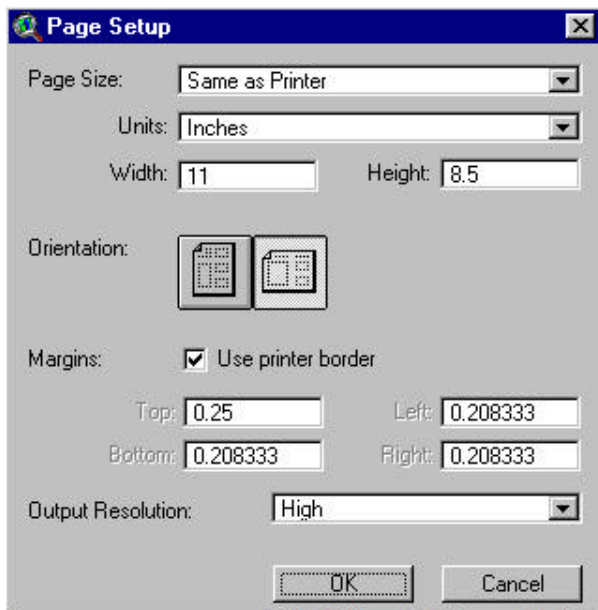

Exhibit 46
Plot - Create – Page Setup

- *Close* returns the screen to the view of the plot.

With the *Redisplay* option, the user can view a previously developed plot of an action or strategy. A screen appears allowing the user to select the file name of a previously saved plot to examine, as shown in Exhibit 47.
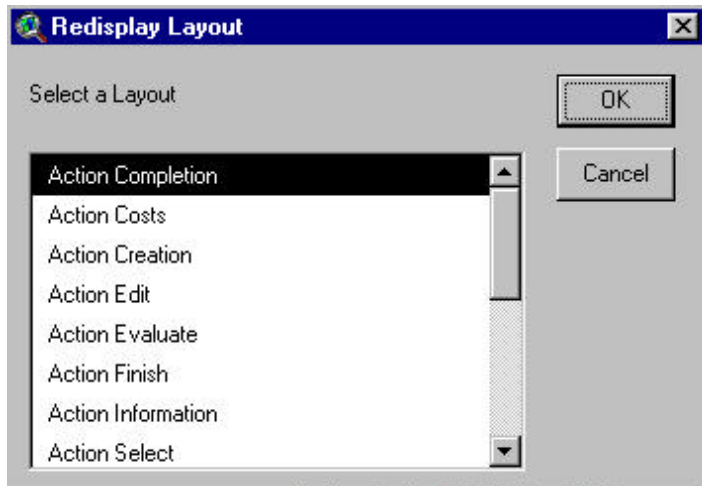
13. ArcView 3.1 and 3.2 Menu

As mentioned in Section 8, the user can switch to the ArcView GIS menus (illustrated in Exhibit 48) at any time. Access the ArcView menu by clicking on the 🔄 button, and use the information icon, zoom icon, or others to review data behind any link or segment of the transportation network. The ArcView manual provides guidance on these functions.
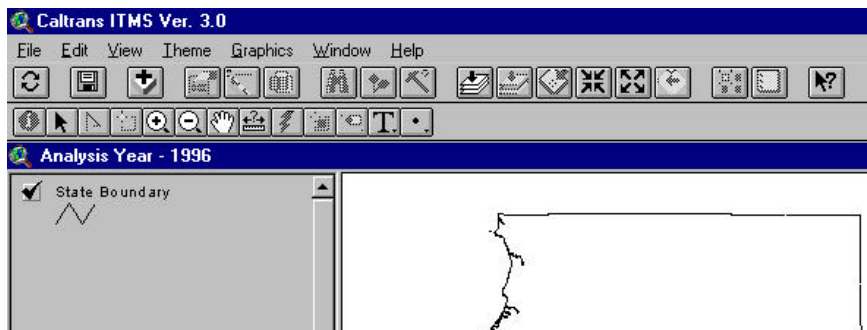

Exhibit 48
ArcView Menu

Other functions might include querying database elements to determine the distribution of values (e.g., proportion of lane miles at different speed intervals or proportion of rail track miles posted at different speed limits). The ArcView menus provide options for modifying maps and views. The ArcView menus can also be used to link other databases (e.g., Westec, TIGER) to the ITMS database or the ITMS spatial layers.

When ArcView operations are complete, the user can return to the ITMS GUI by clicking on the 🔄 button.